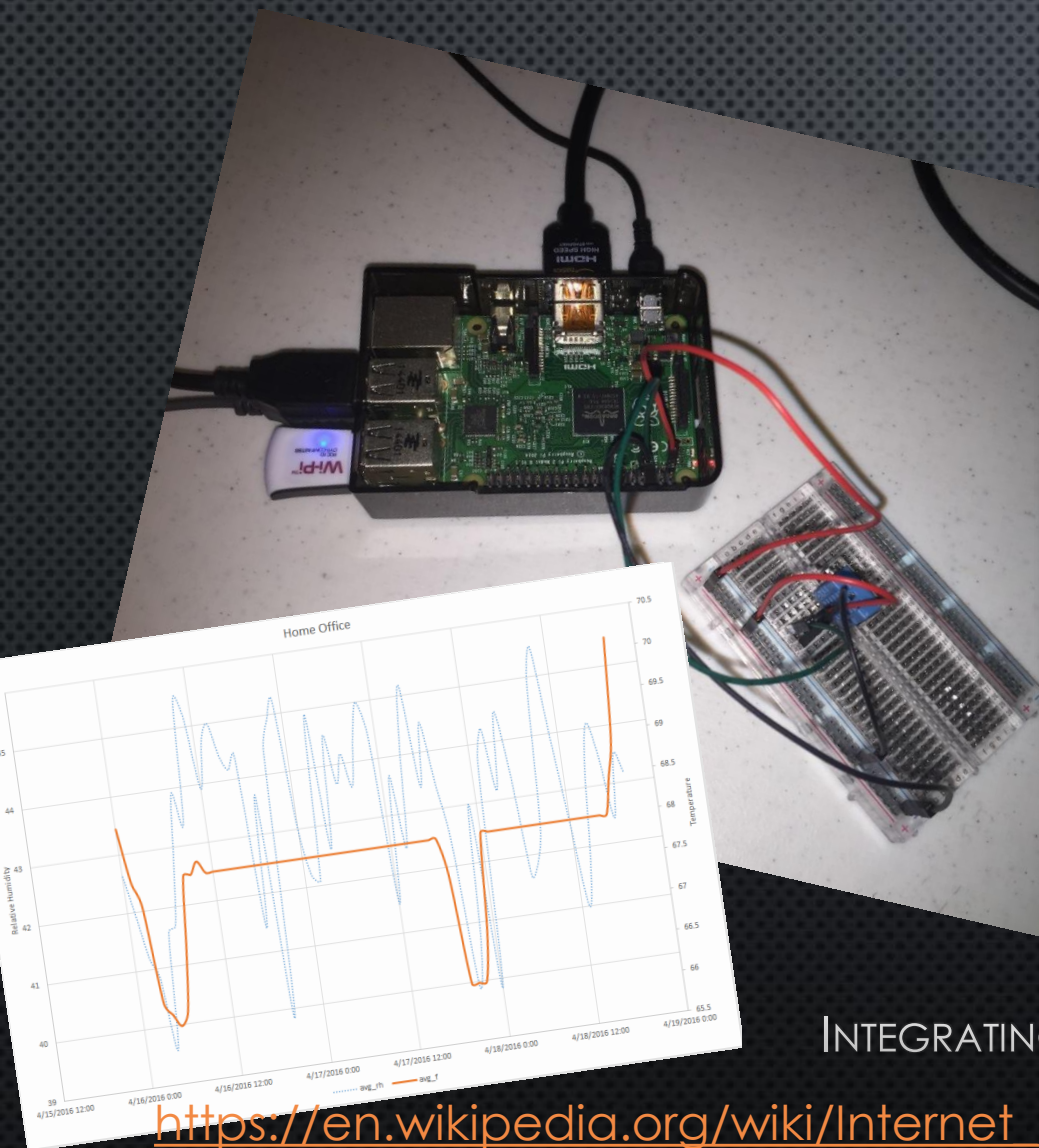


# IOT AND U CAN 2

PART 1, SENSING THE WORLD

CHAD BOSCHERT, GRAVITATE SOLUTIONS

# WHAT IS THE INTERNET OF THINGS?



## Last Reading

71.6°

fahrenheit

22.0°

celsius

45.0%

relative humidity

last updated 2016-04-18 20:51:32.448000

## Recent (hourly)

Date	Hour	Avg F	Avg C	Avg RH	# of Measures
2016-4-18	20	70.1°	21.2°	43.2%	11
2016-4-18	19	68.9°	20.5°	43.5%	12
2016-4-18	18	68.5°	20.2°	42.4%	12
2016-4-18	17	68.0°	20.0°	43.5%	12
2016-4-18	16	68.0°	20.0°	44.1%	12

DEVICES + NETWORK CONNECTIVITY + EXCHANGE DATA

INTEGRATING PHYSICAL WORLD AND COMPUTER WORLD

IMPROVED EFFICIENCY, ACCURACY, AND ECONOMIC BENEFIT

[https://en.wikipedia.org/wiki/Internet\\_of\\_Things](https://en.wikipedia.org/wiki/Internet_of_Things)



## 1

## primary fermentation

10/11/15  
3pm

Ensure that your primary fermenter is capable of holding at least 30 litres (7.9 US gallons) of volume. Pre-mark the primary fermenter at 23 litres (6 US gallons) by filling your 23 litre (6 US gallons) carboy with cool water, then pouring or racking the water into the primary. Draw a line in permanent marker on the fermenter at the water level. This will be your fill level (below). Discard water and begin.



Clean and sanitise primary fermenter and lid, spoon, thermometer, hydrometer and test jar, and wine thief. Rinse thoroughly.

1. Add 2 litres (½ gallon) of hot water to the bottom of your sanitised primary fermenter. Stir the water vigorously and slowly sprinkle the contents of package(s) #2 (bentonite) onto the surface. Stir for 30 seconds to ensure even dispersal, and to break up any clumps.
2. Secure the neck of the bag into the collar on the top of the box, carefully remove the cap, and pour the contents into the primary fermenter with the bentonite solution. Add 2 litres (1½ gallon) of warm water to the bag to rinse out any remaining juice, and add it to the fermenter.
3. Top up fermenter to the 23-litre (6 US) mark. Stir vigorously for 30 seconds.

**NOTE: Making the kit to is crucial to the function stability of the finished volume, it will not turn c you may experience ma**

4. Draw a sample of the juice and use a hydrometer to measure its gravity. It should read between 1.08 and 1.10.
5. If your wine kit contains oak or elder, add them into the primary fermenter now. Stir them under the surface of the juice.
6. Ensure that the temperature of the juice is in this range. Proceed unless the juice is in this range.
7. **ADD YOUR YEAST NOW.** Open the top of the bag and sprinkle the yeast onto the surface of the juice. Do not rehydrate the yeast. Do not stir it in. It will activate on its own.
8. Cover the primary fermenter and place in a location with a temperature of 22°–24°C (72°–75°F). If your primary fermenter uses an airlock, insert it now. Remember to fill airlock halfway with water.

Fermentation should start within 24–48 hours. In 5–7 days proceed to the next step.

Fermented Aail Bath ~ 70°

EXCUSE ME WHILE I...  
WHINE ABOUT WINE

8. Cover the primary fermenter and place in a location with a temperature of 22°–24°C (72°–75°F). If your primary fermenter uses an airlock, insert it now. Remember to fill airlock halfway with water.

Fermentation should start within 24–48 hours. In 5–7 days proceed to the next step.

Fermented Aail Bath ~ 70°



# FERMONITOR

DIY WINE FERMENTATION TEMPERATURE CONTROL SYSTEM



DEMO TIME



# DESIGN PRINCIPALS

- BE LEAN
  - KEEP IT SIMPLE
  - CREATE VALUE
  - IF IT ALREADY EXISTS, USE IT
  - MAKE IT WORK, THEN IMPROVE LATER IF NEEDED
- YAGNI
- LEARN



# RASPBERRY PI

- MULTIPLE VERSIONS, \$5 TO ~\$40
- RASPBERRY PI 2
  - 900MHZ QUAD-CORD CPU
  - 1 GB RAM
  - MICRO SD CARD SLOT
  - 40 GPIO PINS
  - 4 USB PORTS
  - FULL HDMI PORT
  - CAMERA & DISPLAY INTERFACES
  - COMBINED 3.5MM AUDIO JACK & COMPOSITE VIDEO



<https://www.raspberrypi.org/products/raspberry-pi-2-model-b/>



# DHT11

- MEASUREMENT RANGES
  - RELATIVE HUMIDITY 20-90%
  - TEMPERATURE 0-50°C (32-122°F)
- RESOLUTION
  - 1% RH
  - 1°C (1.8°F)
- ACCURACY
  - $\pm 5\%$  RH
  - $\pm 2^\circ\text{C}$  (3.6°F)

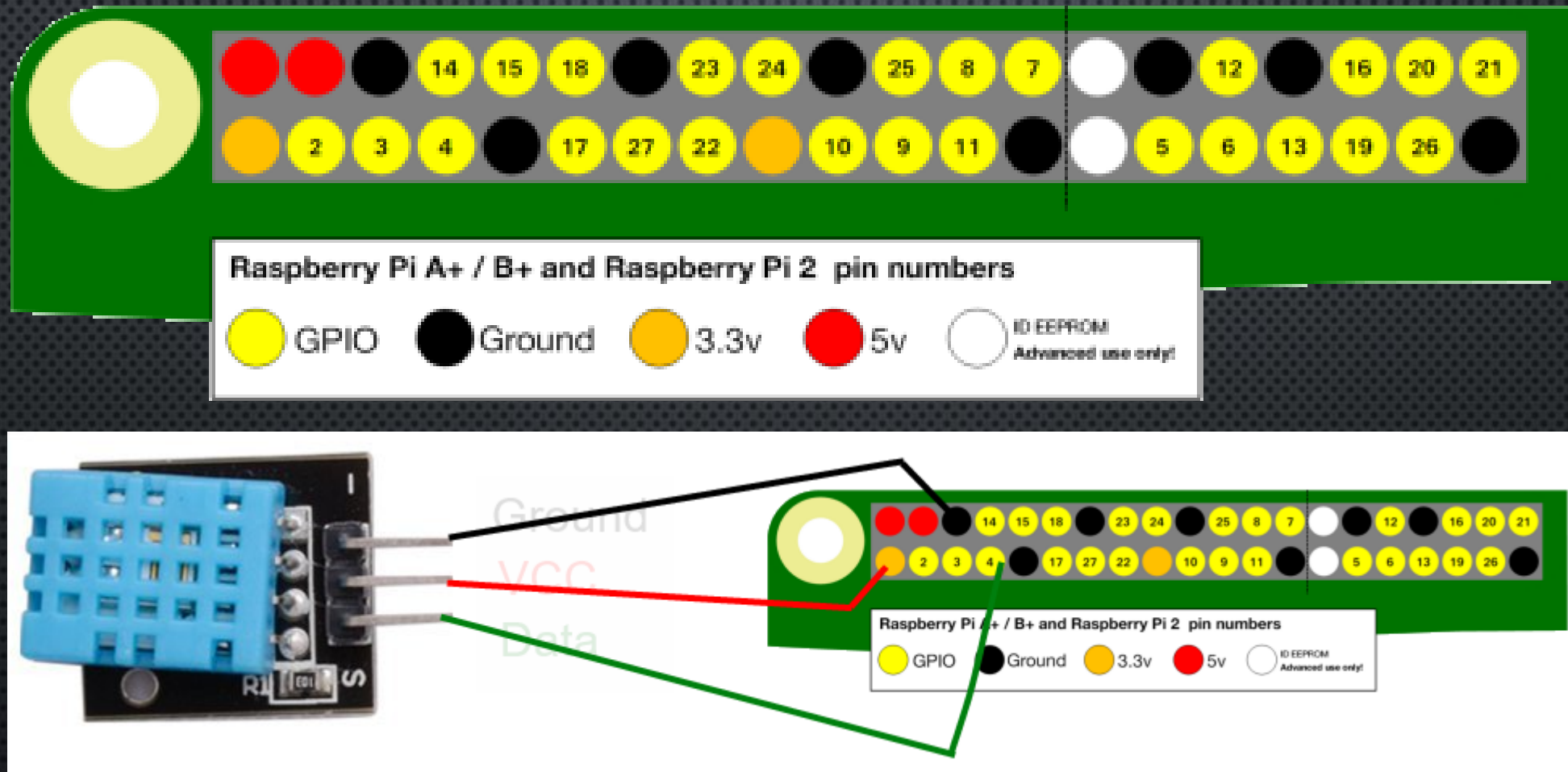
<http://www.micropik.com/PDF/dht11.pdf>  
[https://github.com/szazo/DHT11\\_Python](https://github.com/szazo/DHT11_Python)



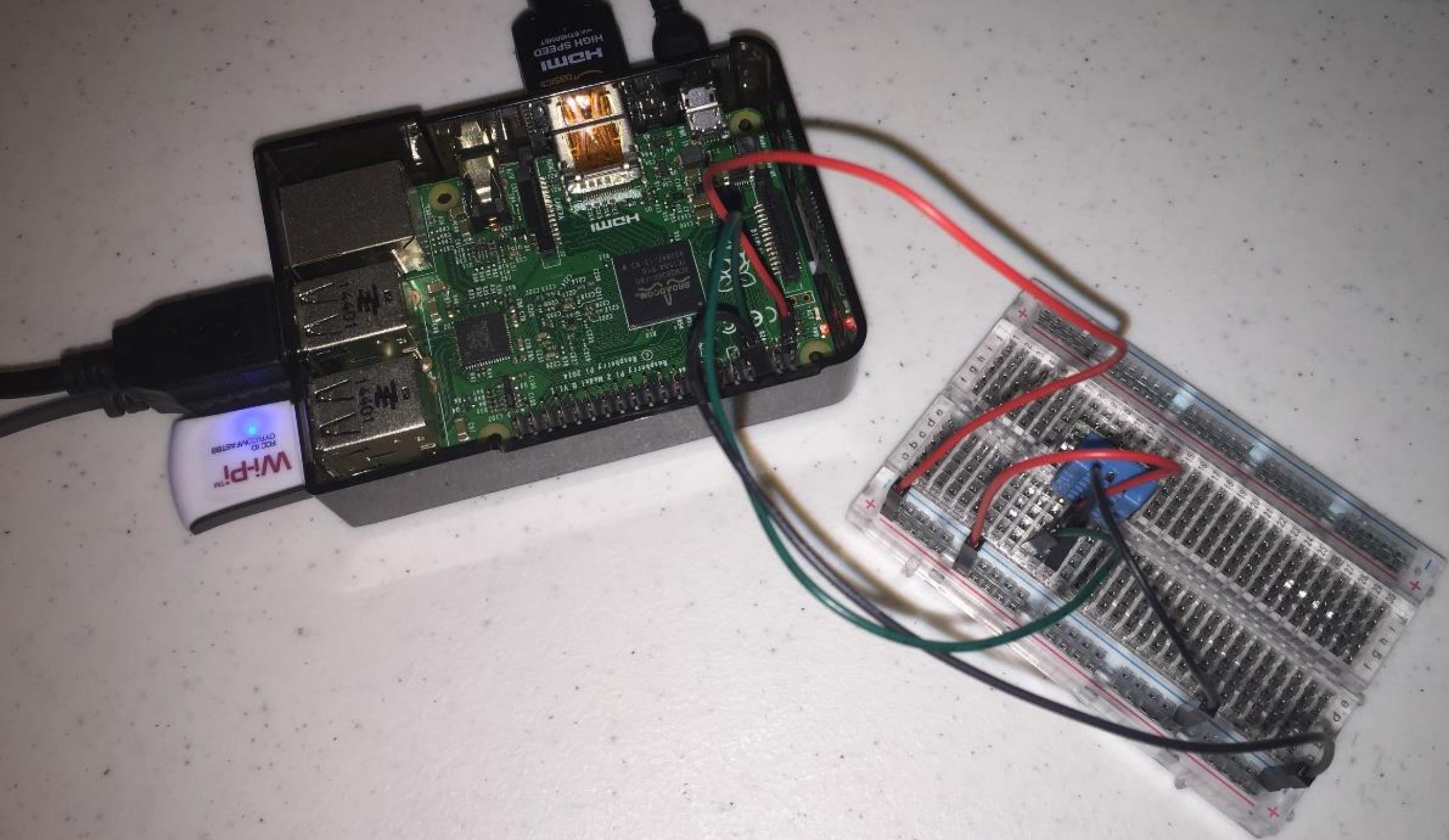
Ground  
VCC  
Data



# WIRING DIAGRAM

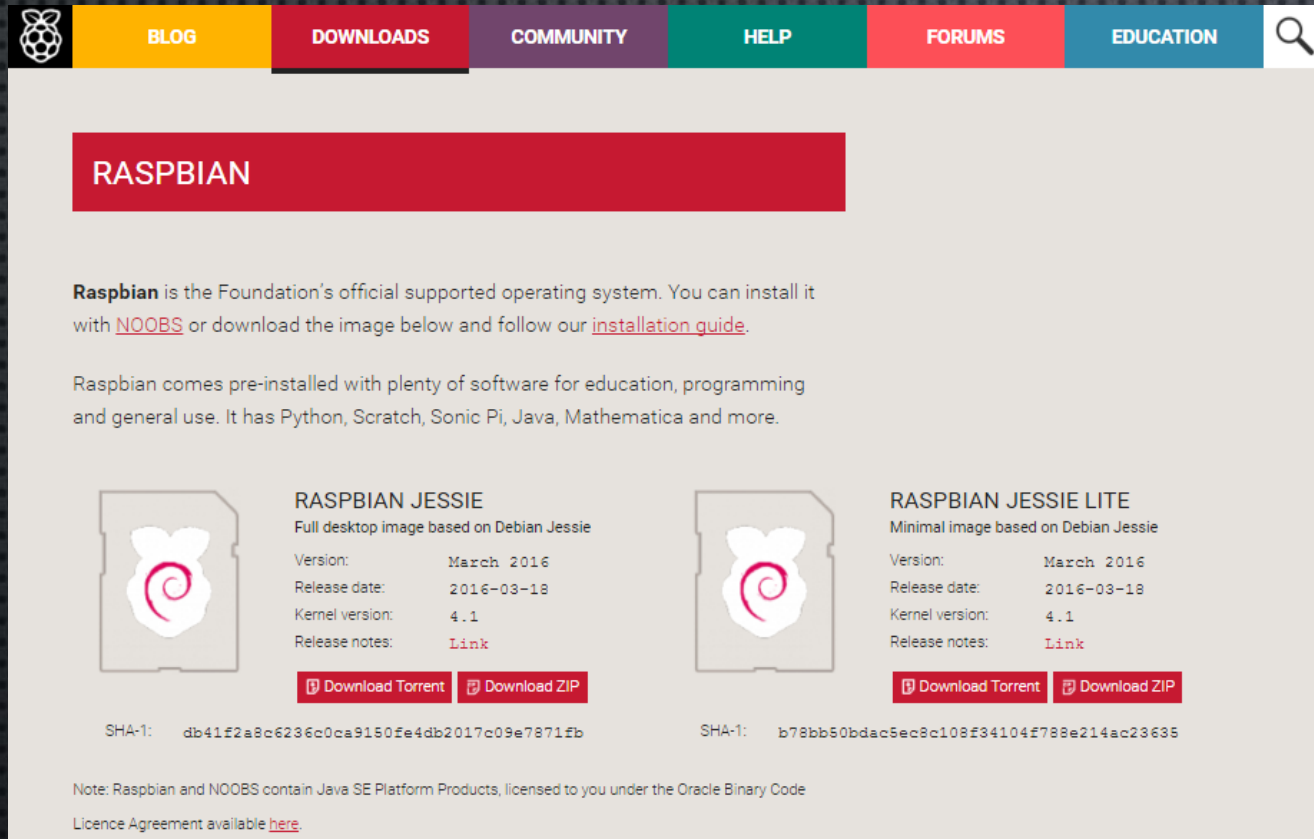








# SETUP YOUR PI





The screenshot shows the Raspberry Pi website's 'Downloads' section for Raspbian. It features a navigation bar with links to Blog, Downloads, Community, Help, Forums, and Education. The main heading is 'RASPBIAN'. Below it, a paragraph states that Raspbian is the official supported operating system and provides links to the NOOBS installer and an installation guide. It also lists pre-installed software like Python, Scratch, Sonic Pi, Java, and Mathematica. Two download options are presented: 'RASPBIAN JESSIE' (Full desktop image) and 'RASPBIAN JESSIE LITE' (Minimal image), both based on Debian Jessie. Each option includes version, release date, kernel version, release notes, and download links for Torrent and ZIP. SHA-1 hashes are provided for both images. A note at the bottom mentions Java SE Platform Products and a link to the license agreement.

**RASPBIAN**

Raspbian is the Foundation's official supported operating system. You can install it with [NOOBS](#) or download the image below and follow our [installation guide](#).

Raspbian comes pre-installed with plenty of software for education, programming and general use. It has Python, Scratch, Sonic Pi, Java, Mathematica and more.

	<b>RASPBIAN JESSIE</b> Full desktop image based on Debian Jessie Version: March 2016 Release date: 2016-03-18 Kernel version: 4.1 Release notes: <a href="#">Link</a> <a href="#">Download Torrent</a> <a href="#">Download ZIP</a> SHA-1: db41f2a8c6236c0ca9150fe4db2017c09e7871fb		<b>RASPBIAN JESSIE LITE</b> Minimal image based on Debian Jessie Version: March 2016 Release date: 2016-03-18 Kernel version: 4.1 Release notes: <a href="#">Link</a> <a href="#">Download Torrent</a> <a href="#">Download ZIP</a> SHA-1: b78bb50bdac5ec8c108f34104f788e214ac23635
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Note: Raspbian and NOOBS contain Java SE Platform Products, licensed to you under the Oracle Binary Code Licence Agreement available [here](#).

```
sudo raspi-config
```

1. Expand File System
2. Internationalization Options
3. Advanced > Hostname

```
sudo apt-get update  
sudo apt-get upgraded
```

grab coffee or beer...

<https://www.raspberrypi.org/downloads/raspbian/>

<https://www.raspberrypi.org/documentation/configuration/raspi-config.md>



# MONGODB

## Setup

- `sudo apt-get mongodb`
  - \*\*Requires Jessie build of Raspbian

## Start Client

- `mongo`

## Useful Commands

- `show dbs`
- `show collections`
- `use <db_name>`
- `db.<db_name>.help()`
- `db.<db_name>.find()`

# FLASK WEB MICROFRAMEWORK

## Setup

- `sudo pip install flask`

## WHY FLASK?

- LIGHTWEIGHT
- SIMPLE TO USE
- FLEXIBLE
- EXTENSIBLE
- WELL DOCUMENTED

<https://www.raspberrypi.org/learning/python-web-server-with-flask/>



# RASPI GPIO

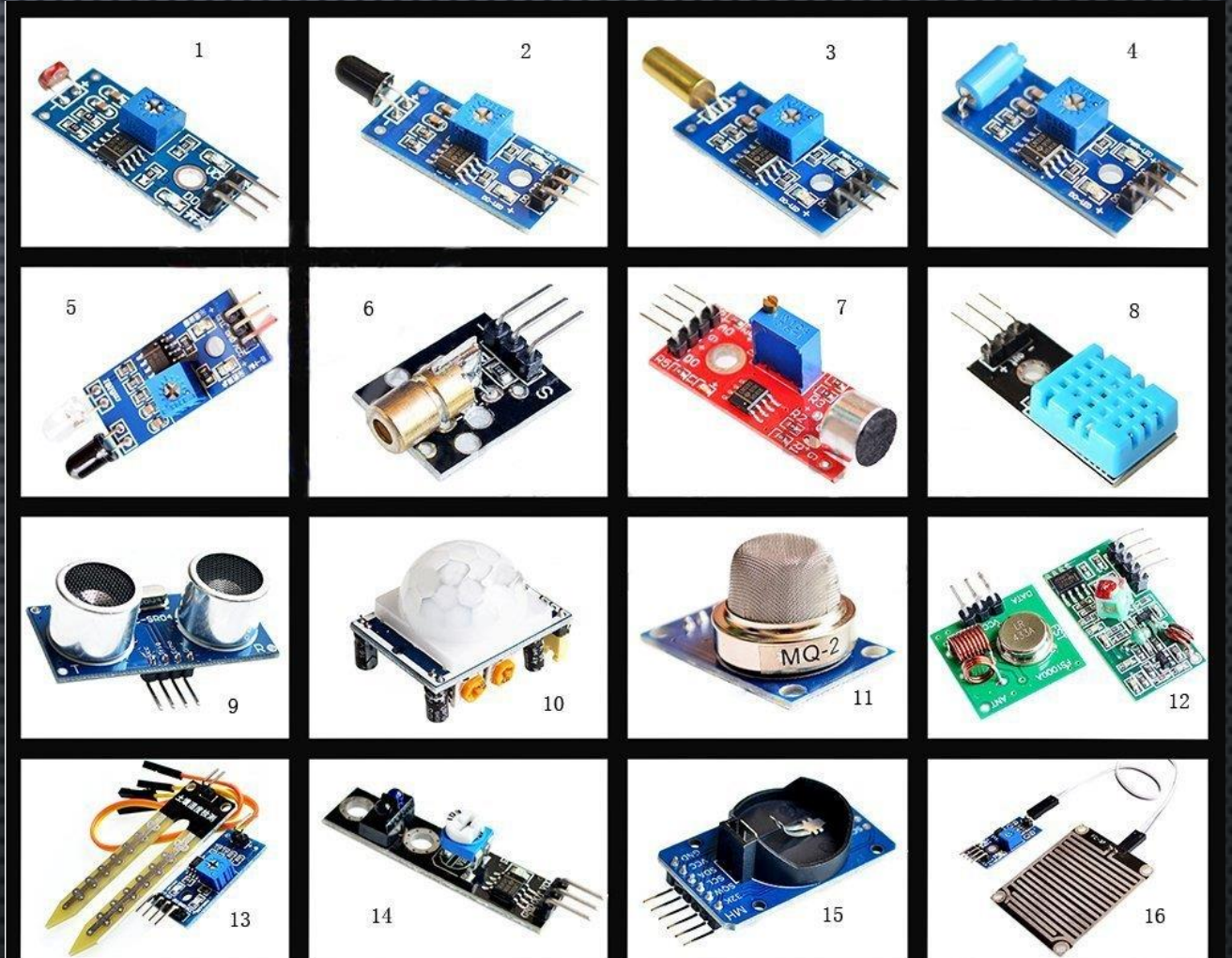
- `import RPi.GPIO as GPIO`
- `GPIO.setmode(<mode>)`
  - `GPIO.BOARD`
  - `GPIO.BCM`
- `GPIO.setup(<channel>, <in/out>)`
  - `GPIO.OUT`
  - `GPIO.IN`
- `GPIO.input(<channel>)`
- `GPIO.output(<channel>, <state>)`
  - `GPIO.HIGH`
  - `GPIO.LOW`
- `GPIO.cleanup()`

<https://www.raspberrypi.org/learning/physical-computing-with-python/>  
<https://sourceforge.net/p/raspberry-gpio-python/wiki/BasicUsage/>



# U CAN 2!

- 16 SENSOR STARTER KIT, \$30 ON AMAZON
- SOLDERLESS BREADBOARD, ~\$3-\$10
- JUMPER WIRES < \$10
- MAYBE SOME RESISTORS, < \$10
- GET DEALS WITH KITS AND A BIT OF RESEARCH



1 .Photosensitive resistance sensor module 2 .The flame sensor module 3 .The tilt sensor module 4 .Vibration sensor module  
5 .Obstacle avoidance sensor module 6 .KY-008 laser head sensor module 7 .Sound sensor module  
8 .DHT11 temperature and humidity sensor module 9 .HC-SR04 ultrasonic sensor module 10.HC-SR501 infrared human body induction module  
11. MQ-2 gas sensor module 12.315M wireless transceiver module 13.The YL-69 soil moisture sensor module  
14.A path tracing module  
15.DS1302 real time clock module  
16.The raindrops module

<http://goo.gl/OjsfSF>